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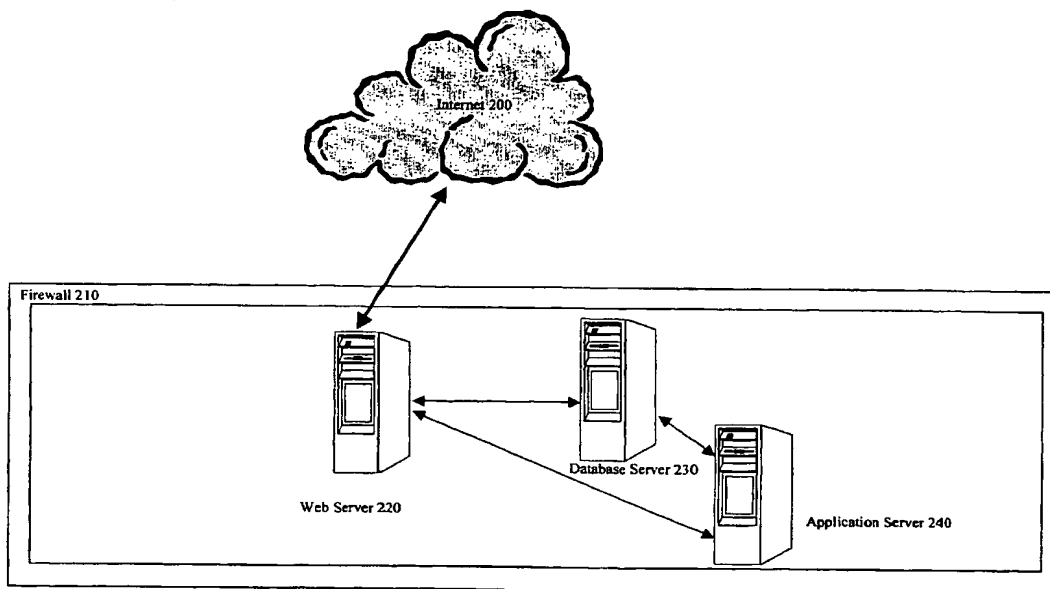
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(54) Title: INVENTORY CONTROL SYSTEM AND METHODS



(57) Abstract: A system and method which allows third-parties to monitor company inventory via the Internet and Worl Wide Web ("web") and automatically order needed items. The present invention also provides a forum through which resellers and customers may directly interact to resell surplus and used equipment. The present invention may also allow a third party to act as a broker, thereby assuring that both equipment purchased is actually delivered, and that the seller is properly compensated.

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INVENTORY CONTROL SYSTEM AND METHODS

PRIORITY AND COPYRIGHT CLAIMS

This application claims the benefit of U.S. Provisional Patent Application Serial No. 60/187,389 filed March 7, 2000, the entire disclosure of which is incorporated herein by reference.

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FIELD OF THE INVENTION

The present invention relates to the field of electronic inventory control. In particular, the present invention relates to controlling healthcare supply inventories.

BACKGROUND OF THE INVENTION

Traditionally, inventory control has been done by the company or organization using the items in the inventory. In smaller offices, inventory control is typically not a high priority, and orders may be placed whenever items are out of stock.

As an office increases in size, inventory management becomes more of a challenge, and monitoring of frequently used or crucial items becomes very important. Typically a person is given the responsibility of monitoring inventory and ordering replacements as supply diminishes. As a company further increases in size, more advanced inventory management techniques may be used. For example, supply and usage trends may be analyzed to determine minimum quantities on hand, and seasonal or other peak usage may be determined.

Some larger offices have switched to automated or semi-automated inventory tracking systems. These automated systems utilize barcode scanners or other electronic identifiers to track outgoing and incoming inventory, and can prepare purchase requests as supplies diminish.

SUMMARY OF THE INVENTION

The present invention improves upon the prior art by shifting the burden of inventory tracking onto a third party; this concept is referred to as vendor managed inventory, or VMI. When a third party provides VMI services for multiple companies, it gains significant buying power which it can use to negotiate better deals, improve supplier responsiveness, and streamline the buying process.

The present invention allows third-parties to monitor company inventory via the Internet and World Wide Web ("web"). In addition, the present invention allows small to medium sized companies to take advantage of VMI by providing a cost-effective solution to their inventory tracking needs.

The present invention utilizes web-enabled technologies to revolutionize inventory management by tracking inventory and automatically contacting suppliers, manufacturers, or distributors when additional supplies are needed. This may result in a labor reduction as compared to the labor-intensive inventory maintenance systems currently deployed.

In addition to reducing labor costs, the present invention may help a company cut other costs. The present invention may help reduce delivery costs by regularly ordering supplies in anticipation of need, thus obviating the need for express shipments. The present invention may also allow third parties to take advantage of manufacturer or distributor specials when offered for the products its customers require, thus further reducing customer cost.

While purchasing is a large part of inventory maintenance, the present invention may also facilitate other transactions as well. For example, the present invention may allow customers to resell products or equipment to other businesses, thereby maximizing utility. Although some in the prior art, such as Neoforma.com and Medibuy.com, have attempted to provide business-to-business equipment resale through web-based auctions, auctions do not provide equipment availability assurances. The present invention provides a forum through which resellers and customers may interact, where the present invention acts as a broker, thereby assuring both that purchased equipment is delivered, and that a seller receives proper compensation.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a block diagram illustrating the major hardware components of the present invention.

Figure 2 is a block diagram illustrating an overview of the software components of the present invention.

Figure 3 is a process flow diagram illustrating sample logic implemented when client software attempts to update data stored in a server.

Figure 4 is a process flow diagram illustrating sample logic implemented when client software polls a data connection.

Figure 5 illustrates a sample RFID portal and related computer equipment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention implements an Internet-based, vendor managed inventory ("VMI") system. A VMI system allows a customer to reduce costs by pushing inventory management responsibilities onto a third party, or manager. Managers may service multiple companies, thus allowing them to negotiate better deals, improve supplier responsiveness, and serve as an effective customer advocate.

The present invention allows managers to inexpensively monitor customer inventory via the Internet and World Wide Web ("web"). The present invention utilizes web-enabled technologies to revolutionize inventory management by tracking inventory and automatically contacting suppliers, manufacturers, or distributors when products are needed. This may result in a labor reduction as compared to the labor-intensive inventory maintenance systems currently deployed.

Figure 1 is a block diagram illustrating the major hardware components of the present invention. As illustrated in Figure 1, the present invention utilizes a client/server architecture to facilitate communication between customer inventory systems and managers. A client running on a Customer Inventory System 130 may be used to track inventory, place special orders, and interact with other customers.

A client may include custom software, such as an application written in Visual Basic, JAVA, or C; commercial software, such as a web page accessible through a web browser; or a combination of custom and commercial software, such as a "plug-in" which operates in a web browser. Examples of common web browsers include

Internet Explorer, developed by Microsoft Corporation of Redmond, Washington, and Navigator, developed by Netscape Corporation of Mountain View, California.

Customer Inventory Systems 130 may allow manual inventory tracking, semi-automated inventory tracking, or inventory may be dispensed using automated systems. By way of example, without intending to limit the present invention, a preferred embodiment of the present invention includes a handheld device, such as a Palm VII device by Palm Computing, Inc., to be outfitted with a barcode scanner. Such a device can allow barcodes or other identifiers associated with each inventory item to be scanned or otherwise entered into the system prior to or at the time of item distribution. As each item is scanned, a count maintained by the present invention may be adjusted to properly track inventory levels. Recipient-specific labels, including product warnings and other information, can then be printed for each scanned item.

Other inventory distribution methods contemplated include, but are not limited to, interfacing the present invention with vending machines. Vending machines may allow accurate inventory tracking without requiring human interaction, except to periodically restock a particular supply or group of supplies. In a preferred embodiment, vending machines may include security measures to prevent unauthorized supply distribution. Such security measures may include, but are not limited to, the use of an identification card and personal identification number ("PIN"), and biometric systems. Vending machines equipped with security systems may restrict access to specific supplies on an individual-by-individual level, or group-by-group basis. Vending machines may also be equipped with label printers that allow warnings and other information to be attached to a dispensed item's packaging.

Alternatively, supply closets or other storage areas can be outfitted with a Radio Frequency Identification (RFID) portal, as illustrated in Figure 5. An RFID portal (Block 500) is similar in structure to airport security metal detectors, except that RFID portals can detect or scan RFID tags as such tags pass through a portal. The present invention can monitor RFID tag identifiers, including identifiers assigned to individuals, such that access to a storage area can be monitored, and items removed by an individual can be tracked without any direct user interaction.

A preferred embodiment of the present invention can also track individual product dispensation, and may require additional information as products are dispensed. By way of example, without intending to limit the present invention, if a

doctor dispenses sample medication to a patient, the present invention may also request a patient identifier, whereas if a package of gauze bandages was removed from inventory to restock an examination room, the present invention may not request a patient identifier. Patient identifiers can be used by the present invention to generate dispensation history reports for various products which may help suppliers and manufacturers to better understand income, race, ethnicity, or other demographic characteristics of typical recipients. The present invention may restrict such reports to only demographic information, and may not include individual-specific information in such reports.

An alternative embodiment of the present invention allows physicians or others to carry a handheld device through which prescriptions can be written while talking with a patient. Such a handheld device can connect to a local inventory management system through a wireless or wired means, and, when appropriate, a prescribed item sample may be automatically dispensed by a vending machine. Alternatively, a message may be displayed at a nurse's station indicating the items to be pulled from inventory. When items are dispensed by a vending machine or pulled from inventory, inventory counts can be decremented as appropriate, and new orders can be placed as necessary.

As inventory is distributed, Customer Inventory System 130 may track supply usage habits to determine minimum acceptable quantities on-hand. Usage information may be studied for various periods of time, and the present invention may create an inventory usage model based on collected data. As models are created and refined, the present invention may modify minimum in-stock thresholds to reflect anticipated usage. As quantity in-stock approaches a calculated or specified threshold, Customer Inventory System 130 may automatically request new supplies from Server 100. Supply requests may include various information, including, but not limited to, urgency of request, customer willingness to accept alternative brands or sizes, billing information, and shipping information.

As Server 100 receives supply requests, Server 100 may request price quotes from several Manufacturer, Supplier, or Distributor 120's ("Distributor 120"). Distributor 120 may respond with quantity available, price, estimated delivery time, and other such information. Server 100 may then automatically evaluate each Distributor 120 response to find the best value given various factors associated with each customer request. When an appropriate Distributor 120 response is chosen,

Server 100 may automatically arrange payment and shipping of requested supplies for Customer Inventory System 130.

Communication between Customer Inventory System 130, Server 100, and Distributor 120 may be achieved through various methods, including, but not limited to, hypertext transfer protocol ("HTTP"), file transfer protocol ("FTP"), simple mail transfer protocol ("SMTP"), or other such related methods.

Although purchasing is a large part of inventory maintenance, a preferred embodiment of the present invention may also facilitate communication between customers, provide a source of information dissemination, and encourage customer interaction. The present invention may facilitate customer communication by allowing customers to resell products, equipment, or excess inventory to other businesses. The present invention may allow information dissemination by providing an up to date catalog of available equipment and other inventory from which a customer may order. The present invention may facilitate customer communication by allowing managers and customers to author and distribute articles describing new rules, regulations, procedures, revenue generation prospects, or other information of interest to other customers.

Customer Inventory System 130 may serve as the primary source of customer interaction with the present invention. Articles, catalogs, inventory information, and other such information may be stored on Server 100, and Customer Inventory System 130 may communicate with Server 100 to obtain requested information.

Figure 2 illustrates a preferred embodiment of Server 100, in which relationships between data storage, web server, and application services provided by Server 100 are illustrated. All client communications may first pass through Firewall 210. Firewall 210 represents a combination of software and hardware which is used to protect the data stored in Web Server 220, Database Server 230, and Application Server 240 from unauthorized access.

As previously described, clients may communicate with the present invention through various protocols, including HTTP. Web Server 220 represents software capable of transmitting and receiving information via HTTP or other protocols. Examples of such software include Internet Information Server, developed by Microsoft Corporation of Redmond, Washington; Enterprise Server, developed by Netscape Corporation of Mountain View, California; and Apache Server, developed by the Apache Software Foundation of Forest Hill, Maryland.

When a client requests information, Web Server 220 may determine whether a client request requires pre-processing, in which case a request is transferred to Application Server 240, or if a request simply requires data to fulfill the request, in which case Web Server 220 may communicate directly with Database Server 230.

Database Server 230 represents commercially available database software, such as Microsoft SQL Server, developed by Microsoft Corporation of Redmond, Washington, Oracle 8i, developed by Oracle Corporation, of Redwood Shores, California, or other, similar software. Database Server 230 may store raw data, such as customer inventory information, customer addresses, vendor names, vendor product classes, and other such similar information. Such information may be transmitted to a client by Web Server 220, or Application Server 240 may interpret information stored in Database Server 230 prior to transmission.

Application Server 240 may contain business rules associated with the present invention, which can be used to interpret Database Server 230 data prior to transmission of that data to a client. In addition to interpreting information stored in Database Server 230 for client use, Application Server 240 may also monitor inventory levels reflected in Database Server 230, contact vendors based on information from Database Server 230, adjust inventory information as new inventory is received, and provide the services necessary to facilitate business-to-business resale of equipment or products stored in Database Server 230.

Web Server 220, Database Server 230, and Application Server 240 each represent software which may run on the same computer, or on multiple computers. In addition, Application Server 240 may be implemented within Database Server 230 as a set of business rules.

An alternative description of the present invention follows, in which the present invention is described through a series of functional specifications. This information is included for enablement purposes, and describes the best mode contemplated at the time the present specification was filed. While the following functional specification describes a preferred embodiment of the present invention, descriptions within the functional specification should not be construed as limiting the present invention.

To avoid confusion, the following terms are used in this functional specification:

Customer – Refers to a buyer of products via the present invention.

Customers can have "open account" relationships to avoid credit card and COD shipment problems.

Linked Supplier – A distinction is made to avoid confusion with other vendors doing business with the present invention, given that payables may be in a common accounts payable system. Distributors, manufacturers, or other vendors (collectively "suppliers"), are distinguished by whether they are using the present invention's inventory tracking and accounting software, and therefore have live Internet linkages into their databases for queries, order processing, and billing.

Manual Supplier - If a supplier provides goods or services through the present invention, but tracks inventory through a manual interface, such a supplier may be termed a "Manual Supplier". Open account relationships may be maintained between Linked or Manual Suppliers avoid payment complexities.

Non-linked Supplier - Suppliers not linked to the present invention.

Products – Items for sale via the present invention.

Customer Inventory -- A list of products to be maintained at a given customer site.

In addition to the general definitions set forth above, this functions specification also defines a set of system functions. System functions may fall into one of the following general sub-system categories:

Interactive – human interface and related functions for tracking inventory counts, inventory consumption rates, ordering critical products, and the like.

Interactive processes may be web-based or PC-based (client-server).

Nightly Processes – periodic processes through which orders can be generated and invoicing and related processes can be performed, including interaction with Distribution system at distributor warehouses.

Corporate – processes performed within corporate offices, but which update a database. Includes accounting, client data management, and other such processes.

Distribution – Linked Suppliers integrated with the present invention. Industry standard Enterprise Resource Planning (ERP) software may be bundled with commercial financial software to provide a complete business system to Linked Suppliers.

Database Design -- A database schema which may be utilized in a preferred embodiment of the present invention.

The present invention in general, and this functional specification specifically, defines styles and functions included in detailed web pages and other user interface elements that are intended to be available system wide. Web pages, application windows, program screens, and transactions within the present invention should observe common rules. These rules include, but are not limited to:

- No customer can view, inquiry into, update or in any way alter another customers data. Transactions can use an IP address or other unique identifier as a cross-check against a customer ID coming in with transmitted pages to insure rule enforcement. For such security procedures, customer IP addresses or other unique identifiers may only be changed through a function accessible only to Corporate staff.
- No Linked Supplier can see data belonging to another linked supplier.
- System parameters controlling customer options can be set through an account setup and editing process. Such a process may be accessed by only someone with an authorized identifier. Initially, such identifiers may only be given to Corporate Staff.
- Data changes will generally be reflected by a transaction log or transaction history, which may be accessible to customers or distributors, and to which Corporate Staff with appropriate security levels may have access.

Functions involving data changes may be performed as server-side scripts, rather than through client-side logic. In general, such server-side scripts can utilize a logical flow similar to Figure 3. As Figure 3 illustrates, client software running on a customer machine may generate a page containing data to be updated by a web server and transmit said page to said web server (Block 300).

When a web server receives a page from a customer machine, the present invention may attempt to process any changes requested by said page. If such changes are successful (Block 320), the present invention may return a confirmation page or cause a confirmation message to be displayed to a customer machine, and appropriate transaction logging may occur.

If changes are not successful, the present invention may increment a retry count by one (Block 340). If the retry count is less than or equal to three, the present invention may retransmit customer changes (Block 370) to Block 310 in an effort to make any appropriate changes. If the retry count exceeds three (Block 350), the

present invention may cause a page containing any error codes or other feedback information to be displayed on a client machine. Such a page may also contain original client data changes as well as a means for resubmitting said changes (Block 360).

Client software may also periodically verify that a data connection exists between said client software and a server acting as part of the present invention. Such software may follow the logic illustrated in Figure 4 to achieve accurate data connection monitoring. As Block 400 illustrates, client software may send one or more TCP/IP Ping commands or other network test commands to verify that a high-speed connection is still available to a server acting as part of the present invention.

If a high-speed network connection is detected, the present invention can continue normal operations (Block 410). If a high-speed network connection is not detected, the present invention may attempt to reestablish such a connection (Block 420). If a high-speed network connection can be reestablished (Block 430), the present invention may continue normal operations (Block 410). If a high-speed network connection cannot be established, a lower speed network connection, such as a dial-up network connection, may be established by the present invention (Block 440). If a lower speed network connection can be established, the present invention may continue normal operations, including periodically attempting to reestablish a high-speed network connection (Block 410).

If a lower speed network connection cannot be established, client software may display an application or page with alternative user interface and alternative functionality (Block 460). Such alternative functionality can include local storage of product usage information, local inventory tracking, and limited reordering via a dial-up or other temporary connection with a known supplier (Block 470). A client functioning without a data connection may periodically attempt to reestablish high or low speed network connections (Block 480). When a connection is reestablished (Block 490), a client may transmit product usage scan information to a server acting as part of the present invention.

In addition to an inventory tracking application, the present invention may also utilize a high speed network connection to transmit new product offerings or special promotions to a client for display to a customer. As new products are entered into a Products table or similar data structure, the present invention may cause such a product to appear on a client. In a preferred embodiment, the present invention may

allow customers to select products in which a customer is interested, and the present invention may only display new products or special deals meeting a customer's prior specifications. Such specifications can include, but are not limited to, categories by manufacturer, product trade name, specific product type, general product classification, and quantity available or quantity per shipping unit.

A client displaying such information may allow a customer to indicate an interest in a product by typing a command, clicking a button or other graphical interface element, or otherwise interacting with said client. If a customer expresses an interest in a featured product, a client may allow a customer to create a one-time order, or to configure recurring orders.

In addition to allowing customers to record product usage and order new inventory or new products, client software may also display advertisements on a rotating basis, and may be used for other purposes. A typical client software screen may also contain additional information and fields, including, but not limited to, a Product SKU field, a User-ID field, a Doctor-ID field, and a Sales Consultant Contact field.

When customers are not directly interacting with client software, client software may place a cursor in a Product SKU field by default. Placing a cursor in a Product SKU field can allow client software to readily accept an automatically or manually entered product identifier, such as a barcode label scanned via a wedge-style bar-code scanner.

As product identifiers are entered, client software may request a User-ID for each product identifier or set of product identifiers. A User-ID is a unique identifier created for each employee or set of employees within an organization. Such identifiers may be entered manually through an active user interface, such as, but not limited to, a keyboard, touch screen, or number pad, or through a passive user interface, such as, but not limited to, biometric recognition equipment, barcode identifiers worn by or associated with an employee, or through RFID tags worn by or associated with an employee. User-ID's may be combined with passwords to create a more secure inventory tracking system.

User-ID's may be used to track persons removing items from an inventory, but additional tracking or other controls may also be desirable. For example additional authorization may be required when employees remove expensive items or controlled substances from an inventory. The present invention may recognize when such an

inventory item is removed, and client software may request an additional identifier, called a Doctor-ID, as authorization. Client software may even allow any user to enter a Doctor-ID for some inventory items, while for other inventory items a Doctor-ID and related password may be required. A biometric or other positive identifier may be used in place of a Doctor-ID or Doctor-ID and password in some applications.

When appropriate inventory tracking data has been entered into client software, the present invention may transmit such data to a server. A server may send a confirmation message to a client upon receipt of such data. If a confirmation message is not received within a predetermined period of time, the present invention may resend inventory tracking data. If successive resend attempts are unsuccessful, the present invention may follow a process similar to that illustrated by Figure 3. Client software may allow additional inventory scans to occur while waiting for confirmation from a server.

In addition to recording inventory tracking information, client software may also allow a customer to access various options. Such options may include, but are not limited to, an administrative page, an inventory status inquiry page, and an inventory receipt page. An administrative page can allow authorized customers to create, edit, or remove User-ID's, Doctor-ID's, groups of such accounts, and account-specific information. An inventory status inquiry page can retrieve and display a page containing customer inventory records, order status, and other such information.

An inventory status inquiry may be initiated through client software, which can send a page containing customer-specific information, as well as site-specific identification information stored on a client machine. In a preferred embodiment, a server receiving such a request may select records with appropriate site- and user-specific information from a table of customer inventory records. A server may generate a page or screen containing customer inventory information, including information from several tables. Table 1 below provides an example of columns displayed on a typical inventory request screen, as well as sample table and field names from which such data can be drawn.

Column Heading	Source Table	Source Field
Description	PRODUCTS	DESCRIPTION
Product	CUSTOMER INVENTORY	PRODUCT
Quantity In Stock	CUSTOMER INVENTORY	ON HAND_QTY
Order Point	CUSTOMER INVENTORY	ROP
ReOrder Quantity	CUSTOMER INVENTORY	ROQ

Activity Status	CUSTOMER INVENTORY	STATUS
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Table 1

An advantage of the present invention over the prior art is the ability to simplify adding new items or restocking items into an inventory. Linked Suppliers shipping goods to a customer can provide a specially coded packing list, and a customer can automatically or manually enter such a code into client software. Client software can validate a packing list number as belonging to a customer and ensure a packing list is not credited to a customer system more than once. Entry of an invalid or previously validated packing slip can cause client software to display an error message.

If a valid packing slip is entered, client software may retrieve shipment contents from a centralized database or from a supplier database, and automatically update customer inventory information to reflect inventory received. Client software may then display a message confirming successful inventory changes, and return a customer to a main page.

A product search page may also be accessible through client software. A product search page can allow a user to select a search type and, if appropriate, search parameters and search parameter values (collectively "search criteria"). By way of example, without intending to limit the present invention, a product search page may allow a customer to search by specific manufacturer and products of a certain classification.

When a customer has selected appropriate search criteria, client software may pass such search criteria to a server. A server may query a database of products and product descriptions and return products matching or approximating customer search criteria.

If a user has selected a descriptive search, a server may select records from a Products table, or other similar table, whose data matches or approximates descriptive text entered by a user. If a user has selected a parameter search, a server may select Product table records whose fields match or approximate user search requests. To expedite such selections, a server may index descriptions, manufacturers, product classes, product names, and other frequently searched fields.

When appropriate records are selected, a server may transmit such records to client software for display. Client software may present such records in a variety of formats, including, but not limited to, a columnar or tabular format. Table 2 lists sample column names, sample source table names, source field names, and additional functionality client software may present when displaying such records.

Column Heading	Source Table	Source Field
Description	PRODUCTS	SHORT_DESCRIPTION
Product ID	PRODUCTS	PRODUCT_ID
Manufacturer	PRODUCTS	MANUFACTURER
Mfg Item No.	PRODUCTS	MANUFACTURER_ITEM_NUMBER
Prod. Type	PRODUCTS	PRODUCT_TYPE
Prod. Class	PRODUCTIONS	PRODUCT_CLASS
Check Availability	None	Window action field
Add to Stock Plan	None	Window action field

Table 2

As Table 2 indicates, client software can allow a customer to check product availability and add products to a stock plan. In a preferred embodiment, client software may make such functionality available for each record displayed. In an alternative embodiment, records may have check boxes or other selection controls, thereby allowing customers to check the availability of multiple items, and add multiple items to a stock plan.

When a customer checks availability of a product or products, the present invention may search Linked Supplier inventories to determine quantities available, physical location, anticipated delivery times, and the like. When inventory is available, client software may allow a customer to order a product.

When a customer chooses to add a product to an inventory or stocking plan, client software may request restocking and other parameters from a customer, then send appropriate information to a server. A server may add an appropriate entry to a Customer_Inventory or other similar table, thereby enabling inventory tracking through the present invention.

Client software can also allow a customer to request a telephone call, an E-mail, or other contact from a sales consultant. In a preferred embodiment, a customer may select a product or supplier, and client software can query a server to determine an appropriate sales consultant for the selected product or supplier. A user can then

be presented with a dialog box or other interactive interface which asks a customer to confirm a contact request. Once a contact request has been confirmed, client software may cause a server to store a request message in a Contact_Log table or other similar table.

In a preferred embodiment, a server may periodically scan Contact_Log table entries. When new or unanswered requests are found, a server may send a notification to a supplier alerting said supplier of such a request, where such a notification can include a customer E-mail address, telephone number, fax number, or other contact information, as well as other relevant customer and product information.

While the present invention can monitor inventory use and automatically order new inventory when necessary, a customer may anticipate a need for additional inventory based on parameters outside the scope of the present invention. By way of example, without intending to limit the present invention, if the present invention is used in a hospital, and the Olympics was held in or near the city in which the hospital is located, a hospital administrator may foresee the need to order additional quantities of frequently used supplies. Client software can provide a customer with the ability to quickly place such orders.

Customers can initiate such an order by clicking a button or otherwise interacting with a graphical or physical interface. In a preferred embodiment, a customer may select from products or groups of products already included in an inventory or stocking plan, or a customer may search for products through an interface similar to that described earlier. As previously described, customers can designate standard restocking quantities, and client software may use such quantities as defaults when clients are requesting additional inventory. Client software may also present quantities on hand to help customers make smarter purchasing decisions. Based on such information, customers can modify order quantities before submitting an order.

Client software can transmit customer orders to a server. Upon receipt of a customer order, a server can initiate an order fulfillment process.

A server may also automatically place an order based on customer demand. A server may periodically scan a customer inventory table and monitor inventory usage. As inventory is depleted, a server can predict frequently used items, and order appropriate quantities. Initially, a server may order limited quantities, to limit customer costs. A server may increase order quantities for frequently ordered

products as customer usage habits dictate. A server may also construct an historical usage characterization, so that seasonal or other periodic usage patterns can be automatically taken into account.

As orders are placed, a server can query Linked Supplier inventories to determine each supplier's ability to fulfill an order. A server can calculate shipping costs as each order is processed, and a server can select one or more suppliers who can most cost effectively meet customer needs. As qualified suppliers are identified, orders are placed which can include expedited delivery and other options as specified by a customer or as determined by a server.

A server can also post supplier invoices to an accounts payable system, generate customer invoices based on supplier invoices, post customer invoices to an accounts receivable system. A server may further integrate with an automated payment system, thereby limiting invoicing and other such expenses.

In addition to customer and order related functions, a server can also provide administrative functions. By way of example, without intending to limit the present invention, a user who is not a customer can register to be a customer through a server-provided interface. Such an interface may allow a user to specify a business name, business type, executive director or general manager, physical address, mailing address, shipping address, one or more telephone numbers, employee names, employee licensing and accreditation information, and the like.

As users submit such information, a server may validate that an address, telephone number, and zip code are all valid with respect to each other, and that all necessary fields have been filled. If any validations fail, a server may present a data entry page along with any invalid data, thus simplifying data correction.

A server and client software may also allow customers and suppliers to change various information. By way of example, without intending to limit the present invention, suppliers can change pricing; add or remove vendors and products; add, edit, or remove contacts; view account status and open invoices; and perform other such functions. Customers can adjust inventory counts to reflect audit results; add, edit, or remove employees and employee information; update payment and contact information; view account balances and make payments; and perform other such functions.

Linked Suppliers can also take advantage of many of these same features. Linked Suppliers implementing the present invention can track inventory; provide real-time inventory information to prospective customers; accept electronic orders; generate pick/pack lists; track order fulfillment process, including tracking into which containers each item in an order has been placed; generate bar-coded packing lists and shipping labels for each container; and generate invoices.

The present invention also provides Linked Suppliers with other advantages over the prior art. By way of example, without intending to limit the present invention, Linked Supplier inventory needs can be forecast based on prior order history, prior lead times, safety stock quantities, and the like, thereby reducing overall inventory investment. The present invention can also allow enable a Linked Supplier to track processing and shipping status for various products within an order, thereby providing a higher level of customer service. The present invention may also allow managers or other authorized individuals to electronically sign a purchase order, invoice, or other billing or order document and electronically transmit such a document to an appropriate recipient.

To achieve the functionality set forth above, a preferred embodiment of the present invention includes the following table structure. The table structure described below is included for enablement and best mode purposes, and should not be construed as limiting the present invention.

Table Name –

CLIENT_CONTROL

Table Description and function – This table can reside locally on a customer computer. It can store one or more records containing control data needed to manage on and off-line functions remotely. These records can be updated via an update applet transferring data from the Web Server's SQL database to this control. Its purpose is to provide control over the processes running on the local machine even if it is off-line, and to enable it to reconnect automatically.

Column (field) Name	Description
CUSTOMER_ID	Customer ID – matches Customer ID in CUSTOMERS data in the Web Server SQL Database

IP_ADDRESS	This is the IP address for this machine
DSL_PORT	Connection path or port (e.g., COM2) where DSL connection exists; null if there is no DSL line for this machine
DIAL_PORT	Connection path or port (e.g., COM3) where dial-up connection exists; null if there is no dial-up connection for this machine
DIAL_CONNECTION_PHONE	Phone number the software dials to establish a dial-up connection to the Web server system. Null if there is no dial-up connection
DIAL_CALL_BACK	Phone number of the dial-up line; to allow call-back from the web server.

Table Name –

CLIENT_ERROR_LOG

Table Description and function – This table contains an error generation history for processes originating on a customer machine. It can provide an audit trail and view of how well processes are functioning, and a place to record both fatal-error conditions and those that may not need to be displayed to customers. Its data may not be processed, but can be stored for review by system administrators and managers.

Column (field) Name	Description	Field Characteristics & Indexing
ERROR_DATE	Date of error log entry	Index – concatenated with ERROR_TIME
ERROR_TIME	Time of error log entry	Index – with ERROR_DATE
CALLER	Program name generating the error log entry	
ERROR_MESSAGE	Error message generated by the caller program	
USER_VIEWABLE	Yes – if message also displayed on user seen page; No if internal only message	
DATA_DUMP	Data (if any) causing the error	

Table Name –

SYSTEM_ERROR_LOG

Table Description and function – This table can contain a history of errors generated by processes originating from outside a customer machine. The table can provide an audit trail and view of how well processes are functioning, and provide a

place to record both fatal and non-fatal errors. Such data can allow system administrators, programmers, and managers to monitor automated, unattended processes. SYSTEM_ERROR_LOG can use a data dictionary/field structure similar to a Client_Error_Log table.

Column (field) Name	Description	Field Characteristics & Indexing
ERROR_DATE	Date of error log entry	Index – concatenated with ERROR_TIME
ERROR_TIME	Time of error log entry	Index – with ERROR_DATE
CALLER	Program name generating the error log entry	
ERROR_MESSAGE	Error message generated by the caller program	
USER_VIEWABLE	Yes – if message also displayed on user seen page; No if internal only message	
DATA_DUMP	Data (if any) causing the error	

Table Name –

SYS_PARAMETERS

Table Description and function – Stores system-wide parameters in a common table.

Column (field) Name	Description	Field Characteristics & Indexing
PARAM_ID	Identifies parameter	Primary Index
VAR1	First variable	
VAR2	Second variable	
VAR3	Third variable	

Table Name –

CUSTOMER_APPLICATION

Table Description and function – this table can have a data dictionary similar to the CUSTOMERS table, and can be used to temporarily store unapproved, unprocessed customer application data submitted by a Customer/Client Application page. When an application is processed, appropriate records can be deleted from this table.

Column (field) Name	Description	Field Characteristics & Indexing
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See CUSTOMERS		
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Table Name –

MEMBERS_APPLICATION

Table Description and function – this table has may use a data dictionary similar to PRACTICE_MEMBERS, and can temporarily store unapproved, unprocessed customer application data submitted by a Customer/Client Application page. When an application is processed, appropriate records can be deleted from this table.

Column (field) Name	Description	Field Characteristics & Indexing
See PRACTICE_MEMBERS		

Table Name –

CUSTOMERS

Table Description and function – Can store a unique identifier for each customer in a permanent table. Activity logged in CUSTOMER_MAINT_HISTORY table. Can be linked to third-party applications for credit terms, bill to, ship to addresses, phones and other financial data.

Column (field) Name	Description	Comment	Field Characteristics & Indexing
CUSTOMER	Identifies customer	Unique identifier (account number); matches CUSTOMER in A/R system	Primary Index
NAME	Practice Business Name	See Practice Members for doctor data.	Index
SALES_CONSULTANT	Identifies sales consultant assigned to account		Index
IPADDRESS1	Internet address used to link, identify computers in customers office	Can have multiple computers in larger offices.	
IPADDRESS2	Internet address used to link,	Can have multiple computers in larger	

	identify computers in customers office	offices.	
IPADDRESS3	Internet address used to link, identify computers in customers office	Can have multiple computers in larger offices.	
IPADDRESS4	Internet address used to link, identify computers in customers office	Can have multiple computers in larger offices.	
DISCOUNT_CODE	Identifies which discount code is used to calculate prices charged for this customer	Code must be in DISCOUNT_CODES table.	Index
PHYSICAL_ADDRESS	Street address of practice		
PHYSICAL_STATE	State in which the practice is located		
PHYSICAL_ZIP	Zip code of physical location of practice		
SHIP_TO_ADDRESS	Address to which shipments go		
SHIP_TO_STATE	State for ship to address		
SHIP_TO_ZIP	Zip code for ship to address		
MAIL_ADDRESS	Mailing address (for other than shipments)	Literature, documents only (may be a PO Box to which UPS & FedEx cannot ship)	
MAIL_STATE	Mail address state		
MAIL_ZIP	Zip code for mail address		
ADMINISTRATOR	Administrator, manager, etc. of Customer		

Table Name –

PRACTICE_MEMBERS

Table Description and function – This table can be linked to records in a CUSTOMERS table, and can store data pertaining to individual physicians or other health-care professionals working at or with a practice.

Column (field) Name	Description	Comment	Field Characteristics & Indexing
CUSTOMER	Customer to whom the Practice Member is associated	Must be in CUSTOMERS table already	Index – concatenated with MEMBER_NAME
MEMBER_NAME	Name of health-care professional or physician linked to CUSTOMER	Together with CUSTOMER, forms unique record key	With CUSTOMER
MEMBER_TITLE	Title (e.g., Exec. Director) of member		
MEMBER_MAIL_ADDRESS	Separate mailing address for member		
MEMBER_MAIL_STATE	Member mail address state		
MEMBER_MAIL_ZIP	Member mail address zip		
MEMBER_LICENSE_NO	Professional license for member		
MEMBER_LICENSE_EXPIRE	Expiration Date of member's professional license		
MEMBER_DEGREE1	First degree of member		
MEMBER_DEGREE2	Second degree of member		
MEMBER_DEGREE3	Third degree of member		
MEMBER_DEGREE4	Fourth degree of member		
MEMBER_NOTES	Text/comment field		
DATE_NEW	Date this member was added to table		
DATE_LAST	Last activity date		

Table Name –

DISCOUNT_CODES

Table Description and function – can contain decimal values representing a unique price to be charged or discount to be granted to each customer. Any number of customers may use a discount code. When a decimal value associated with a given code is changed, the result is that all prices for all customers using that code are changed. If a customer's discount code specifies a discount value greater than allowed for a given product, the present invention may limit a price to the maximum discount .

Column (field) Name	Description	Comment	Field Characteristics & Indexing
DISC_CODE	Discount code	Identifies specific discount; numbering should be 10,20,30, etc. to allow for insertions in future, e.g. 14	Primary Index
DISC_VALUE	Decimal value for the discount to be given.		
NOTES	Notes; text field for commentary about a particular discount code		

Table Name –

CUSTOMER_INVENTORY

Table Description and function – stores inventory at customer office. One record for each customer/SKU combination, including all that have been used in past, or which are to be used for next ordering cycle. Permanent table. Activity logged in CUSTOMER_INVENTORY_TX table.

Column (field) Name	Description	Comment	Field Characteristics & Indexing
CUSTOMER	Identifies customer		Index – concatenated with PRODUCT
PRODUCT	Identifies product at customer's site		Indexed with CUSTOMER
ON_HAND_QTY	Quantity of an item on hand at this customer		
ROP	Reorder point	When on hand qty	

	quantity	falls to or below this quantity, a new order is triggered for the product.	
ROQ	Quantity to be ordered	Ordering process uses this quantity when a product is "triggered"	
STATUS	Activity status of item	Values: Active (default, normal setting) NoOrder (continue to use up inventory, but no more orders) NoUse (do not accept scanned usage of product)	Index

Table Name –

PRODUCTS

Table Description and function – identifies products available for sale at any point in time. Includes products no longer active. One record for each product/SKU/Item Number.

Column (field) Name	Description	Comment	Field Characteristics & Indexing
PRODUCT_ID	Identifies product; SKU; also is "item number"		Primary Index
SHORT_DESCRIPTION	Short description appearing on most printed outputs & screens		Index
LONG_DESCRIPTION	Long description for additional description		Index, built so each word is indexed separately.
MANUFACTURER	Company making product; Must be in MANUFACTURERS table		Index
MANUFACTURER_ITEM_NUMBER	Manufacturer's product identifier		Index
STATUS	Item status	Values: Active (default,	

		normal usage) NoOrder (accept usage scans, no orders) NoUse (do not accept usage scans; no activity; obsolete or discontinued)	
PRODUCT_CLASS	Marketing/sales classification of product		Index
PRODUCT_GROUP	Commodity classification of product		Index
PRODUCT_LINE	Financial reporting classification of product		Index
SELL_START_DATE	Date that new orders for this product can be processed	Prior to this date orders will not be processed (new product so not available yet)	
SELL_END_DATE	Date after which new orders for this product cannot be processed	After or on this date, orders will not be processed (discontinued product)	
PRODUCT_PICTURE	Product Picture bit map image	JPEG or GIF	

Table Name –

MANUFACTURERS

Table Description and function – This table stores all manufacturers whose products may be carried in the PRODUCTS table. It serves as a reference and validation table for products.

Column (field) Name	Description	Comment	Field Characteristics & Indexing
MANUFACTURER ID	Short abbreviation for manufacturer		Primary Index
MANUFACTURER _NAME	Normal business name for manufacturer		Indexed
DATE_ADDED	Date this Manufacturer was		

	added to the table		
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Table Name –

ORDERS

Table Description and function – stores orders generated by nightly process and/or by critical ordering process, which are then downloaded to distributor. Serves as order “header” record. Linked to ORDER_DETAIL table where line items are stored. No maintenance history log table. One record for each order generated and downloaded.

Column (field) Name	Description	Comment	Field Characteristics & Indexing
ORDER_NO	Order Number; unique identifier for the order	Generated by ordering processes; increments SYSTEM_PARAMETER for order number	Primary Index
ORDER_DATE	Date order generated		Index
ORDER_TIME	Time order generated		
ORDER_SOURCE	How order was generated	Sources are: AUTO – nightly process MANUAL – manual order entered on terminal in customer's office.	
CUSTOMER	Customer on the order		Index
LINKED_SUPPLIER	Linked Supplier to whom the order was downloaded		Index
ORDER_STATUS	Status of the order; shows latest status only, sequence is presumed	Values: GEN – generated PLACED – downloaded to supplier S_BILLED – supplier has invoiced Med-e-Track C_BILLED – system has	Index

		converted supplier invoice to customer invoices	
STATUS_DATE	Date which status changed		
SHIP_TO_ADDRESSES	Address to which orders is to be shipped; appears on downloaded order data		
ORDER_PRODUCT_TOTAL	Total value of order for product only; not including tax, shipping, other charges		

Table Name –

ORDER_DETAIL

Table Description and function – stores line item detail on ORDERS. One record for each line item on an order.

Column (field) Name	Description	Comment	Field Characteristics & Indexing
ORDER_DTL_ORDER_NO	Order number to which this detail record belongs		Index – concatenated with ORDER_LINE_NUMBER
ORDER_LINE_NUMBER	Line number for order.	With Order_Dtl_Order_no, forms a unique identifier	
PRODUCT	Product identifier for item ordered		Index
ORDER_QUANTITY	Quantity of the product that is being ordered.		
SHIP_QUANTITY	Quantity of the item shipped; as reflected on an uploaded, processed supplier invoice/packlist		
CUSTOMER_UNIT_PRICE	Price to be charged to		

	customer		
CUSTOMER_UNI_SALES_TAX	Sales tax, if any to be charged customer		
PRODUCT_ORDERED_SU BTOTAL	Value = Order_Quantity * Customer_Unit_p rice		
PRODUCT_SHIP_SUBTOT AL	Value = Ship_Quantity * Customer Unit Price		
LINKED_SUPPLIER_UNIT _COST	Price to be paid Linked Supplier for this item		
LINKED_SUPPLIER_PRO DUCT_SHIP_SUBTOTAL	Value = Ship_Quantity * Linked_Supplier_ Unit_cost		

Table Name –

LINKED_SUPPLIER

Table Description and function – Stores and sets up each linked supplier, i.e., distributor that is linked into the web site. One record for each supplier that will be, is now, or has been linked at one time into Med-e-Track. Activity logged in LINKED_SUPPLIER_MAINT_HISTORY. Account is linked to Supplier table in the SOLOMAN Accounts Payable subsystem.

Column (field) Name	Description	Comment
SUPPLIER	Supplier's ID	Unique identifier
SUPPLIER_IP_ADDRESS	IP Address where linking process occurs	
OPEN_DATE	Date the relationship was setup/started	

Table Name –

SUPPLIER_INVOICE

Table Description and function – stores uploaded invoice/pack lists from linked suppliers. Serves as “header” record for invoices. A given Order can have multiple invoices. Linked to SUPPLIER_INVOICE_DETAIL records which carry line item detail. Invoices uploaded from distributor reflect orders they have shipped and are then used to generate Customer invoices. The uploaded invoice data is also

transferred to the Accounts Payable module of the Solomon IV software for corporate accounting/tracking. Customer invoices generated and recorded in this table are also transferred to the Accounts Receivable module.

Column (field) Name	Description	Comment	Field Characteristics & Indexing
INTERNAL_INVOICE_ID	Internal, system generated invoice identifier	Insures unique invoice identification in case of similar supplier invoicing schemes/numbers	
ORDER	Order number which the invoice is a shipment/bill for.		
SUPPLIER_INVOICE	Invoice identifier from supplier	Uploaded invoice data	
SUPPLIER_INVOICE_DATE	Date of/on supplier invoice that was uploaded		
SUPPLIER_INVOICE_TIME	Time that supplier invoice was uploaded	Invoice time may not appear in supplier database.	
AP_DATE	Date supplier invoice data posted to AP tables		
AP_TIME	Time supplier invoice data was posted to AP tables		
CUSTOMER_INVOICE	Invoice ID generated by nightly process to bill customer for shipment	Presence indicates that nightly process has run, generating this separate invoice number.	
CUSTOMER_INVOICE_DATE	Date customer invoice generated by nightly process		
CUSTOMER_INVOICE_TIME	Time of customer invoice generation process.		
AR_DATE	Time		
SHIPMENT	Shipment document number	May be separate ID from invoice no.	Index on this field for packing slip data retrieval.
SHIP_VIA	Shipping method; e.g., UPS Ground		

Table Name—

INTERNAL_INVOICE_SHIP_DETAIL

Table Description and function – This table contains shipment information for the shipment covered by the Internal Invoice. There is one record for each carton comprising the shipment covered by the Invoice. It is linked to the Internal_Invoice table.

Column (field) Name	Comment
INTERNAL_INVOICE_ID	
SHIP_CARTON_ID	Together with invoice id, comprises unique record ID
TRACKER_NO	

Table Name –

SUPPLIER_INVOICE_DETAIL

Table Description and function – this table carries the line item level detail for invoices uploaded from the linked supplier/distributor. Some line item level detail is used to update Order data to support quick order status inquiries and track back-ordered items.

Column (field) Name	Description	Comment
INTERNAL_INVOICE_ID	Identifier for internal invoice no	
INTERNAL_INVOICE_LINE_NUMBER	Line number for internal invoice	Together with Internal Invoice identifier, forms unique key
SHIPPED_PRODUCT	Product shipped	
SHIP_QUANTITY	Quantity shipped	
UNIT_PRICE	Supplier's Unit price	
UNIT_TAX	Sales Tax (if any)	
EXTENDED_PRICE	Value = Ship_qty * Unit Price	Product only subtotal
LINE_TAX_TOTAL	Value = Ship_Qty * Unit Tax	
LINE_TOTAL_AMOUNT	EXTENDED_PRICE + Line_Tax_total	

Table Name –

SUPPLIER_COST

Table Description and function – Stores prices to be paid to each Linked Supplier in the system. One record for each linked supplier and SKU. Permanent table. Activity logged in SUPPLIER_COST_MAINT_HISTORY table.

Column (field) Name	Description	Comment	Field Characteristics & Indexing
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Table Name –

SUPPLIER_COST_MAINT_HISTORY

Table Description and function – records changes made to SUPPLIER_COST records. One record for each field changed during an update of a given record.

Column (field) Name	Description	Comment	Field Characteristics & Indexing
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Table Name –

PRODUCT_MAINT_HISTORY

Table Description and function – records changes made to PRODUCTS table. One record for each field changed during an update of a given record.

Column (field) Name	Description	Comment	Field Characteristics & Indexing
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Table Name –

PRODUCT_CLASS

Table Description and function – Identifies valid product classes; serves as a reference table.

Column (field) Name	Description
PROD_CLASS_CODE	Code for product class description
DESCRIPTION	Text/descriptive name for product_class code

Table Name –

PRODUCT_GROUP

Table Description and function – Identifies valid product groups; serves as a reference table.

Column (field) Name	Description
PRODUCT_GROUP_CODE	Code for product group description
DESCRIPTION	Text/descriptive name for Product Group Code.

Table Name –

PRODUCT_LINE

Table Description and function – Identifies valid product lines; serves as a reference table.

Column (field) Name	Description
PRODUCT_LINE_CODE	Code for product line description
DESCRIPTION	Text/descriptive name for product line code

Table Name –

CUSTOMER_INVENTORY_TRANSACTIONS

Table Description and function – transaction history table for activity altering data in Customer_Inventory table; one record for each change recorded; main use will be recording inventory activity, although transactions will be generated for changes to status, ROP, ROQ and Notes values, i.e., non-on-hand quantity values. Each transaction affects only one data field. Transaction code indicates what update/change activity was performed, and therefore which data field was updated.

Column (field) Name	Description	Comment
TRAN_NO	Unique identifier for each transaction; non significant	Functions like a check number.
TRAN_DATE	Date transaction processed	
TRAN_TIME	Time transaction processed	
TRAN_ID	Code identifying transaction	Values: TBD
PRODUCT	Product identifier of item affected	
QTY		
CUSTOMER	Customer whose inventory data was updated/changed	
USER_ID	User performing transaction	
BEFORE_VALUE	Value of data field prior to update action	
AFTER_VALUE	Value of data field after update action	

Table Name –

CONTACT_LOG

Table Description and function – this table accepts transactions from the consultant request function, enters and tracks them for followup and management purposes.

Column (field) Name	Description
SALES_CONSULTANT_ID	ID in Sales Consultants table.
REQUEST_DATE	Date customer initiated request
REQUEST_TIME	Time customer initiated request

Table Name –

CUSTOMER_USERS

Table Description and function – This table stores information about each user at a customer's site. There are two classes of users, supervisor and staff. Only a user with supervisor rights can add new users. The web page "hard-wires" who the customer is so customer users are kept associated with the correct customer.

Column (field) Name	Description	Comment	Field Characteristics & Indexing
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Table Name – SALES_CONSULTANTS

Table Description and function – This table stores data about each Sales Consultant. It is essentially a reference table.

Column (field) Name	Description
SALES_CONSULTANT_ID	Unique identifier * record key
CONSULTANT_SHORT_NAME	Short name, nickname, initials to be used on screens, reports
CONSULTANT_FULL_FIRST_NAME	First name of consultant
CONSULTANT_LAST_NAME	Last name of consultant

It should be obvious to one skilled in the art that the present invention allows inventory tracking and management through a combination of manual, semi-automated, and automated means. The present invention also allows a manager to purchase in bulk and take advantage of promotions and other special offerings, thus reducing inventory costs. In addition, the present invention reduces the amount of inventory which must be kept on-hand by accurately modeling and predicting inventory needs. The present invention further provides customers with the ability to review new equipment, communicate with each other, and buy and sell excess inventory, refurbished equipment, and the like.

While the preferred embodiment and various alternative embodiments of the

present invention have been disclosed and described in detail herein, it may be apparent to those skilled in the art that various changes in form and detail may be made therein without departing from the spirit and scope thereof, including applying the present invention to fields other than healthcare.

CLAIMS

I claim as my invention:

- 1) An inventory management system comprising:
 - one or more computers;
 - one or more databases residing on said computers, in which inventory and customer information is stored;
 - client software providing an interface to said database and performing administrative functions;
 - a user identification subsystem;
 - a subsystem through which new products can be added to said inventory database, and which enables proper accounting of restocked products within said inventory database; and
 - a subsystem which accounts for a product or products within said database as such products are removed from inventory.
- 2) The inventory management system of Claim 1, in which one or more of said subsystems are comprised of an optical reader which can read specially coded information on an object or person.
- 3) The inventory management system of Claim 1, in which one or more of said subsystems are comprised of an electronic device for scanning wirelessly accessible identifiers associated with objects or persons.
- 4) The inventory management system of Claim 1, in which said user identification subsystem is comprised of a biometric identification device.
- 5) The inventory management system of Claim 1, in which said client software permits registration and removal of individual users, and modification of user information.
- 6) The inventory management system of Claim 1, in which said client software allows users to be classified into groups, and where permissions or roles are assigned to such groups.

- 7) The inventory management system of Claim 1, in which said client software allows products to be grouped into classifications, allows restrictions to be placed on distribution of such products, permits recording of patient information when individual products or products belonging to a particular group or set of groups are dispensed, and allows printing of product specific or group specific labels or information to be included with each product removed from inventory.
- 8) The inventory management system of Claim 1, in which said client software monitors inventory levels and reports anticipated shortages.
- 9) The inventory management system of Claim 1, in which said client software monitors inventory levels and generates orders to cover anticipated shortages.
- 10) The inventory management system of Claim 1, in which said client software allows users to order new products or to supplement inventory when desired.
- 11) The inventory management system of Claim 1, in which said client software allows users to specify a price for goods for sale within an inventory.
- 12) A vendor managed inventory system, comprising:
 - one or more suppliers maintaining inventory utilizing an inventory management system;
 - one or more customers maintaining inventory utilizing an inventory management system;
 - a central server, which facilitates communications and inventory management between said customers and said suppliers; and,
 - a redundant data connection between said suppliers, said customers, and said central server.
- 13) The vendor managed inventory management system of Claim 12, in which said central server receives inventory information from customers and suppliers, anticipates inventory shortages, generates orders to cover such shortages, selects suppliers and products for such orders, places orders with selected suppliers, and monitors order status.
- 14) An inventory distribution system comprising:
 - a vending machine;

a computer connected to said vending machine;
software running on said computer;
a printer;
a user identification subsystem; and
a data entry subsystem.

- 15) The inventory distribution system of Claim 14, in which said user identification subsystem is comprised of a biometric scanner, RFID reader, barcode scanner, keyboard, touch sensitive display, or combinations thereof, and through which users can positively identify themselves to said computer via said software.
- 16) The inventory distribution system of Claim 14, in which said data entry subsystem is comprised of an active or passive user interface, and through which users can request dispensation of certain products.
- 17) The inventory distribution system of Claim 14, in which said printer prints product information when requested and as necessary to satisfy applicable regulations.
- 18) The inventory distribution system of Claim 14, further comprising a central server and a redundant data connection between said vending machine and said server.
- 19) The inventory distribution system of Claim 18, in which said computer monitors distribution of products contained within said vending machine, transmits such distributions to said server via said redundant data connection, and through which said server can notify a vending machine service provider of any inventory shortages.
- 20) A automated method of inventory management involving the steps of:
 - accounting for received products in an inventory;
 - monitoring products as such products are removed from an inventory;
 - calculating trends based on the frequency with which products are used;
 - determining optimal product quantities for each order, such that shipping costs are reduced and price points for different quantities are taken into account while also reducing expenditures;
 - ordering additional stock as needed;
 - tracking said orders;

calculating order fulfillment trends based on delivery times from each supplier and for each product; and,

determining preferred suppliers based on such order fulfillment trends.

- 21) The automated inventory management method of Claim 20, in which the step of accounting for received products in an inventory involves electronically reading documentation supplied with each package and automatically updating inventory information to reflect package contents.
- 22) The automated inventory management method of Claim 20, in which the step of monitoring products as such products are removed from an inventory involves electronically reading a product identifier associated with a product or group of products.
- 23) The automated inventory management method of Claim 20, further including the step of identifying a user removing products from an inventory by electronically retrieving an identifier from said user.
- 24) An automated order fulfillment method, comprising the steps of:
 - receiving an availability and pricing request from a customer for one or more products;
 - determining acceptable alternatives for said products based on customer preferences;
 - determining quantities available, pricing, quantities necessary for a price break, and anticipated delivery times from one or more suppliers to meet said request, including any acceptable alternatives;
 - selecting products, product quantities, and suppliers that provide the most value while still meeting customer inventory needs;
 - generating product pick and pack slips for each supplier;
 - recording products as they are "picked" from a supplier inventory;
 - recording products as they are packed into shipping packages;
 - generating package packing slips and shipping labels;
 - correlating shipping and packing information;
 - shipping said packages; and
 - tracking said shipments.
- 25) The automated order fulfillment method of Claim 24, in which picked products are recorded by electronically scanning identifiers associated with such products.

- 26) The automated order fulfillment method of Claim 25, in which picked products are recorded by electronically scanning identifiers associated with such products using a handheld computing device, to which a barcode scanner is attached.
- 27) The automated order fulfillment method of Claim 24, in which the step of recording products as they are packed further includes the step of scanning an identifier associated with a shipping package prior to scanning individual items packed into a shipping package.
- 28) The automated order fulfillment method of Claim 24, in which the packing and shipping labels include a machine readable identifier.
- 29) A vendor managed inventory and group purchasing system, comprising:
- one or more servers;
 - one or more databases running on said servers;
 - client software running on one or more computers at a customer site, which is capable of monitoring customer inventories and reporting such information to said server via a redundant data communications connection;
 - client software running on one or more computers at a supplier site, which is capable of monitoring product quantities on hand and supports multiple product prices depending on order quantities, and which is capable of transmitting such information to said server via a redundant data communications connection; and
 - software running on said server that consolidates customer orders such that customer costs may be decreased by leveraging the consolidated order quantities.

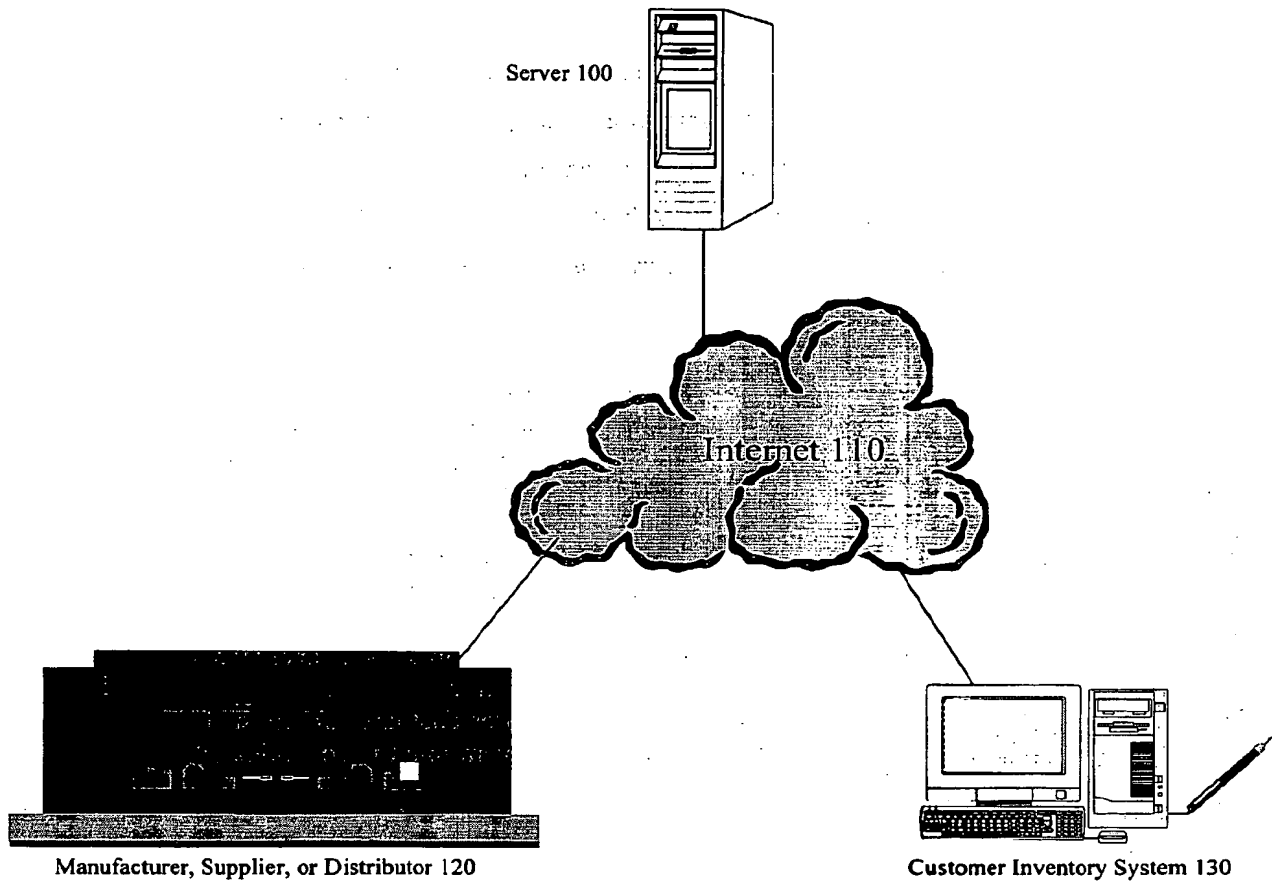
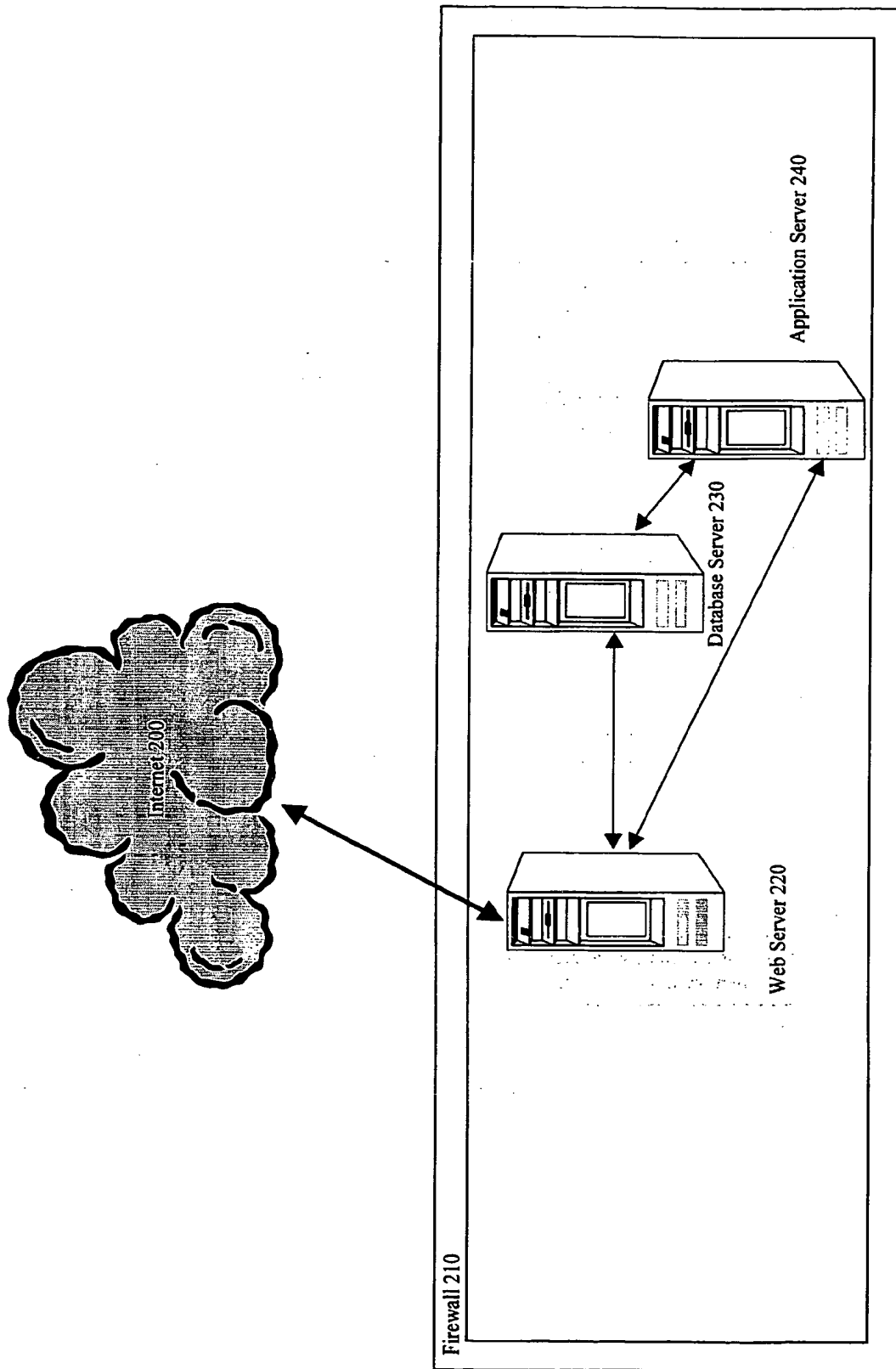
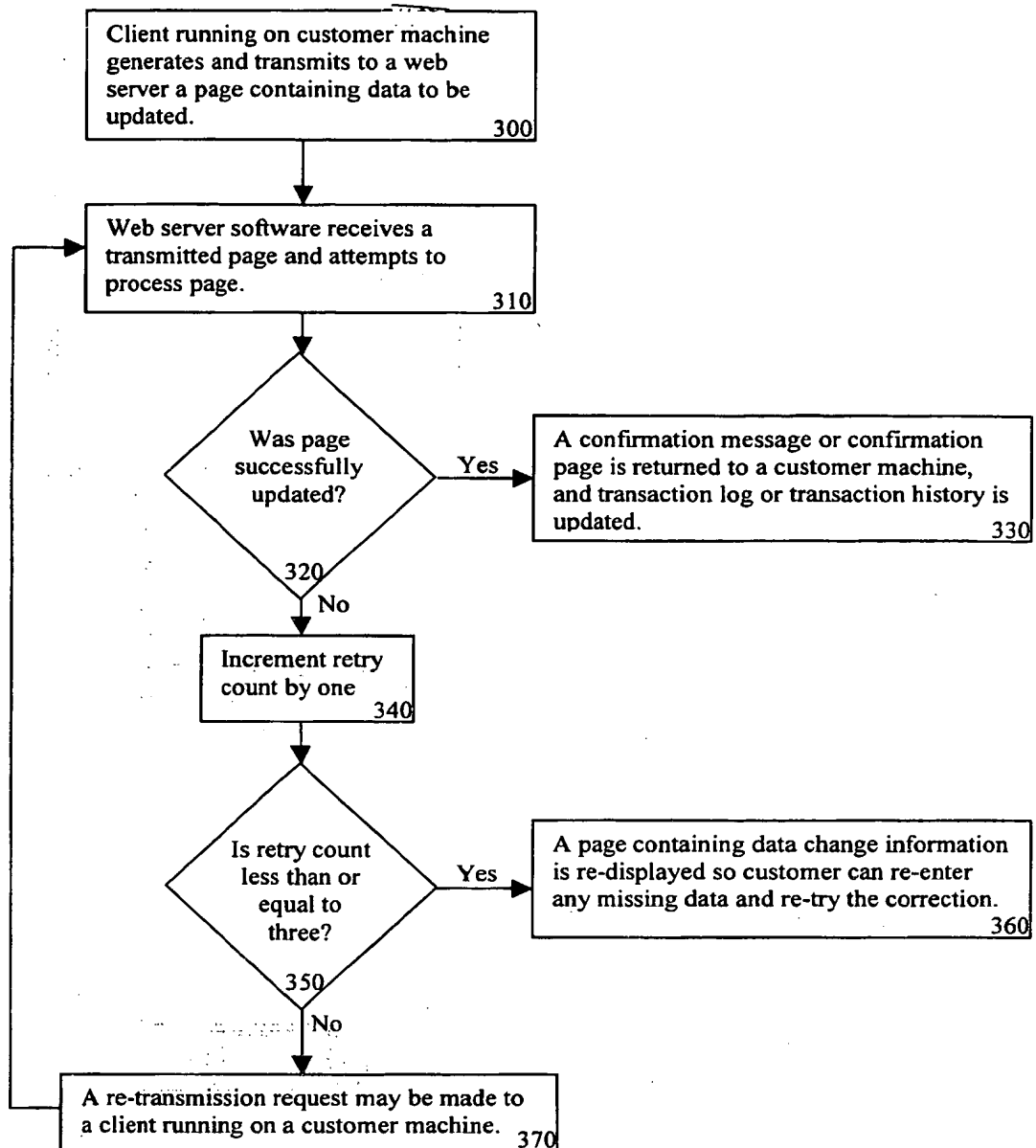
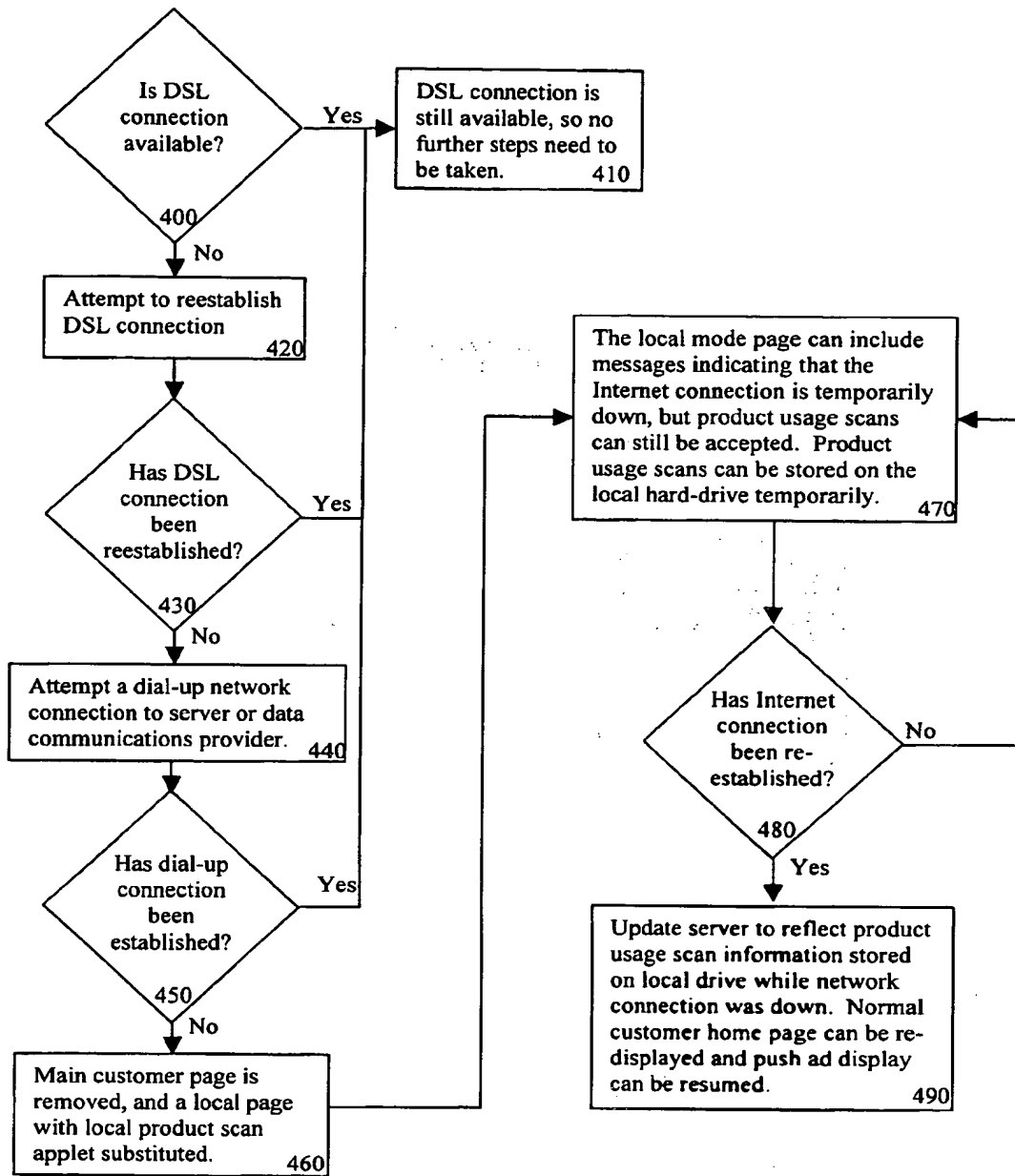


Figure 1

**Figure 2**

**Figure 3**

**Figure 4**

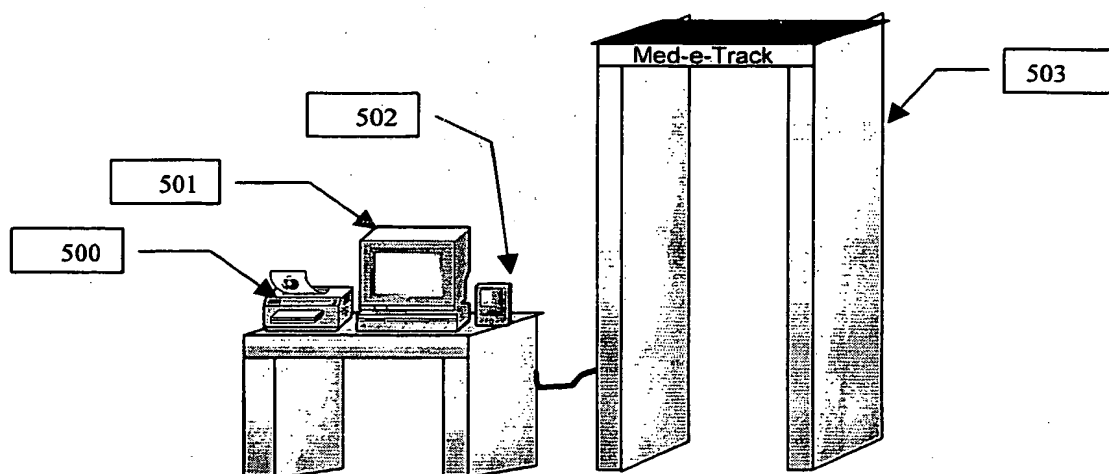


Figure 5

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US01/07253

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G06F 17/60; G06G 1/14

US CL : 705/22,28

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 705/22,28

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A,E	US 6,249,774 B1 (RODEN et al) 19 June 2001, see entire document.	1-29
A	US 5,983,198 A (MOWERY et al) 09 November 1999, see entire document.	1-29
A	US 5,920,317 A (McDONALD) 06 July 1999, see entire document.	1-29
A	US 5,893,076 A (HAFNER et al) 06 April 1999, see entire document.	1-29
A	US 5,638,519 A (HALUSKA) 10 June 1997, see entire document.	1-29
A	US 5,608,621 A (CAVENEY et al) 04 March 1997, see entire document.	1-29
A	US 5,638,516 A (DUZETT et al) 10 June 1997, see entire document.	1-29

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

* Special categories of cited documents:	
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

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